REMARKS

The Examiner is thanked for the careful examination of the application. However, in view of the following remarks, the Examiner is respectfully requested to reconsider and withdraw the rejections.

The Examiner has rejected claims 1 - 3, 9 - 24, 27 and 29 - 30 under 35 U.S.C. 102(b) as being anticipated by US 2001/026667, hereinafter *Kawanishi*. We respectfully disagree with the examiner's interpretation of the disclosure of Kawanishi.

Claim 1 defines an elongate waveguide combination that includes, among other features, a cladding region that includes a relatively high refractive index boundary region that surrounds the core region; the boundary region should have either (1) at most two-fold rotational symmetry or (2) a rotational symmetry that reduces the rotational symmetry of the waveguide to at most two-fold rotational symmetry; and the symmetry of the boundary region resulting at least in part from azimuthal variations therein, which are substantially uncharacteristic of the cladding region.

However, *Kawanishi* fails to disclose several of the features of claim 1.

The relatively high refractive index boundary region that surrounds the core region is part of the cladding, and should be seen in relationship to the cladding. In other words, the high refractive index boundary should have a high refractivity with respect to the remaining part of the cladding. The Examiner refers to Fig. 7 in *Kawanishi*. In Fig. 7, it can be seen that the fiber has a core 61 which is a hollow

hole (paragraph [0048]) or a material with a lower refractive index than the material forming the photonic crystal structure cladding (paragraph [0051]).

However, the fiber of Fig. 7 in *Kawanishi* does not have a relatively high refractive index boundary region that surrounds the core region. In fact the boundary region of the Fig. 7 fiber in *Kawanishi* has an effective refractive index similar to the remaining photonic crystal cladding.

With regard to the boundary region having either (1) at most two-fold rotational symmetry or (2) a rotational symmetry that reduces the rotational symmetry of the waveguide to at most two-fold rotational symmetry, the Examiner also refers to Fig. 7 in *Kawanishi*. However, the fiber of Fig. 7 in *Kawanishi* does not have a boundary region which has either (1) at most two-fold rotational symmetry or (2) a rotational symmetry that reduces the rotational symmetry of the waveguide to at most two-fold rotational symmetry.

The boundary region that surrounds the core region 61 in Fig. 7 in *Kawanishi* has a four-fold rotational symmetry, as noted by the four holes abutting the boundary region.

Furthermore the *Kawanishi* Fig. 7 boundary region does not ***reduce*** the rotational symmetry of the waveguide to at most two-fold rotational symmetry. As used herein, this means that the whole fiber including the boundary region should have two-fold rotational symmetry, or less, and that the whole fiber when looking apart from the boundary region should have a higher symmetry. In other words if you take two identical cross-sectional pictures of the fiber including the boundary

region, put them on top of each other and turn one of them a whole circle the pattern of the whole fiber of the two pictures must at the most be matching two times. If you look apart from the boundary region, the pattern of the fiber excluding the boundary region of the two pictures should have more match than when including the boundary region. See, e.g., Figure 18 of the present application.

In *Kawanishi,* because the cladding in itself provides two-fold rotational symmetry irrespectively of the symmetry of the boundary region, the *Kawanishi* Fig. 7 boundary region does not ***reduce*** the rotational symmetry of the waveguide to at most two-fold rotational symmetry.

Claim 1 further states that the symmetry of the boundary region resulting at least in part from azimuthal variations therein, which are substantially uncharacteristic of the cladding region.

However, the symmetry of the boundary region in Fig. 7 in *Kawanishi* does not result at least in part from azimuthal variations therein, <u>which are substantially uncharacteristic of the cladding region</u>. The boundary region of the fiber in Fig. 7 in *Kawanishi* is clearly entirely a function of, or characterized by, the choice of core/cladding structure and accordingly any azimuthal variations in the boundary region of the fiber of Fig. 7 in *Kawanishi* are characteristics of the cladding region.

Even though it is mentioned that the core is not limited to any specific shape [57] in *Kawanishi*, this does not provide any teaching that would prompt the skilled person to modify the fiber shown in Fig. 7 in *Kawanishi* to thereby arrive at the present invention. In particular, nothing in *Kawanishi* leads the skilled person to

provide the boundary region of the fiber surrounding the core with azimuthal variations which are substantially uncharacteristic of the cladding region.

It is thus clear that the present invention as claimed in claim 1 is not anticipated by *Kawanishi*. Claims 2-30 comprise all the features of claim 1 and are at least for the same reasons not anticipated by *Kawanishi*.

The Examiner has also rejected claims 31-34 under 35 U.S.C. 102(e) as being anticipated by US 2004/0179796, hereinafter *Jakobsen.* Applicants respectfully disagree with the Examiner's interpretation of the disclosure of *Jakobsen*.

Jakobsen fails to disclose several of the features of claim 1. For example *Jakobsen* does not disclose a method of forming photonic crystal fiber including forming, at the interface between the core region and the cladding region, a boundary region, comprising one or more relatively high refractive index regions, and which has at most two-fold rotational symmetry due to azimuthal variations, which are uncharacteristic of the cladding region.

Jakobsen discloses a method for fabricating fibers, where the use of individual capillary tubes is eliminated. The method disclosed in *Jakobsen* comprises providing a tube for use in a preform for a microstructured fiber. The tube has an inner and outer surface in a longitudinal direction along the axis of said tube and a cross section perpendicular thereto and the tube has a number of grooves and/or slits arranged at pre-determined positions in the inner and/or the outer surface and extending in the longitudinal direction of the tube. The grooves/slits may, e.g., be

provided by a laser ablation technique or a laser assisted etching technique. By arranging two or more tubes inside each other, a channel may be provided.

Nothing is mentioned in *Jakobsen* relating to rotational symmetry, and in particular not to two-fold rotational symmetry; the structure of the core/cladding boundary region, and in particular nothing concerning azimuthal variations; and azimuthal variations which are uncharacteristic of the cladding region.

Jacobson is completely irrelevant to the present invention and the skilled person would not find any teaching in *Jakobsen* which would lead him anyway near the present invention as defined in claims 31-34. It is thus clear that the present invention as claimed in claims 31-34 are not anticipated by *Jakobsen*. Furthermore, since both the present application and *Jakobsen* are assigned to the same entity, *Jakobsen* is not available as prior art under 35 USC 103.

The Examiner has rejected claims 4 - 8 under 35 U.S.C. 103 as being unpatentable over *Kawanishi*, in view of U.S. Patent No. 7,106,933, hereinafter *Han*.

Han relates to a polymer fiber useful for the transmission of the THz frequency band. *Han* does not provide any teaching that would lead the skilled person to combine any of the features described therein with the disclosure of *Kawanishi*. Even though the polymer fiber of *Han* may have nodes joined between two boundary veins, *Han* has not provided any teaching which would lead the skilled person to select this feature, combine it with the teaching of *Kawanishi*, and additionally modify the resulting fiber so that nodes would be arranged in the boundary region to provide it with either (1) at most two-fold rotational symmetry or

(2) a rotational symmetry that reduces the rotational symmetry of the waveguide to at most two-fold rotational symmetry.

The suggestion that the skilled person would find it obvious to select the feature relating to the nodes from *Han* (which only relates to polymer fibers and does not provide any teaching towards two-fold rotational symmetry) and incorporate it in modified form into *Kawanishi* to thereby arrive at the present invention is purely hindsight.

Thus, *Han* does not overcome the deficiencies set forth above concerning the rejection based on *Kawanishi.*

Claims 25, 26, and 28 have been rejected under 35 U.S.C. 103 as being unpatentable over *Kawanishi*, in view of other secondary references. However, the secondary references also do not overcome the deficiencies set forth above concerning the rejection based on *Kawanishi.*

Accordingly, claims 4 – 8, 25, 26, and 28 are patentable over the applied prior art.

In view of the foregoing remarks, the Examiner is respectfully requested to reconsider and withdraw the rejections.

In the event that there are any questions concerning this response, or the application in general, the Examiner is respectfully requested to telephone the undersigned attorney so that prosecution of the application may be expedited.

Respectfully submitted,

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